NON-ADAPTIVE GROUP BEHAVIOR

BY ALEXANDER MINTZ

City College of New York

Theoretical Considerations

It is common knowledge that groups of people frequently behave in a way which leads to disastrous consequences not desired or anticipated by the members of the group. At theater fires, people often block the exits by pushing, so that individuals are burned or trampled. Since it normally takes only a few minutes for a theater to be emptied the strikingly non-adaptive character of this behavior is obvious.

In the explanations for the occurrence of such behavior offered by social psychologists, intense emotional excitement resulting from mutual facilitation (or "contagion" or "suggestion") and leading to interference with thinking, adaptive behavior, and the operation of moral codes, has tended to be viewed as the decisive factor. Explanations of this general type can be found in numerous textbooks on social psychology, from that by Ross (21) to those by Britt (3), Vaughn (27), and Young (31). Ultimately they stem from the theories of the nature of crowd behavior of Le Bon (12), who has been an extremely influential figure in the thinking on social issues of the past fifty years. He has been an important ideological ancestor of fascism [1] and nazism; thus Hitler's ideas on social psychology as expressed in *Mein Kampf* closely resemble those of Le Bon. Le Bon's theories embodied features which were severely criticized by a number of psychologists. In speaking of emotional interaction between members of a group leading to personality alterations, he postulated the emergence of a group mind based on collective racial unconscious tendencies. These notions of a group mind and racial unconscious were rejected by most psychologists. Nevertheless, his critics often accepted the more essential features of his theory, and crowd membership is often viewed as having an essentially brutalizing effect on people as a result of allegedly regressive, non-adaptive consequences of intense emotion generated by social facilitation.

The explanations of the non-adaptive behavior in panics in terms of emotional excitement are related to a tendency still prevalent in modern psychology to view all emotion as essentially superfluous and even harmful. For a number of years, many textbooks defined emotion as "disorganized response" and the like. In some textbooks, emotion was treated mainly as something to be controlled. Until quite recently, many books of child rearing contained advice designed to weaken the emotional intimacy between parent and child (28). Actually, a distrust of emotion has been endemic in Western thought ever since the days of Stoic philosophy. In recent years, however, another point of view has tended to emerge. The desirable features of emotional spontaneity have been emphasized by many psychotherapists for a number of years and there are psychoanalysts who characterize the cure in psychotherapy as a process of emotional liberation. More recently, the notion that emotion is essentially non-adaptive has been severely criticized in theoretical psychology (14), and a lively controversy about the question appears to be in progress.

Material will be presented in this paper suggesting that violent emotional excitement is not the decisive factor [2] in the non-adaptive behavior of people in panics and related situations. Instead, it appears to be possible to explain the non-adaptive character of such behavior in terms of their perception of the situation and their expectation of what is likely to happen. In recent times, a number of psychologists have tended to interpret features of human behavior in terms of the phenomenal properties of the situation in which it occurs. Thus Katona reported several studies of the role of the economic situation as experienced by consumers and of their expectations in their economic behavior (7, 8).

[1] In his last book, Le Bon (13) quotes an interview with Mussolini in which the latter stated that he read *The Crowd* many times and that he often refers to it.

[2] Its existence is not denied.

S. Asch and others explained the effects on value judgment, commonly attributed to prestige suggestion, in terms of the additional cognitive background of the material to be judged provided by the supposedly prestige-loaded items (1, 2). G. Murphy (19) attempted to make the behavior of a foreign government understandable in terms of the political situation as it must be perceived by its members. Wertheimer (29) and his collaborator, E. Levy (15), discussed a number of cases of mental disorder as understandable in terms of the phenomenal properties of their phenomenal environment. As a general postulate, the congruence between the organization of our perception, thought, and expectation on one hand, and our motivation, valuation, and action on the other hand, has been discussed extensively by Koffka (10), Tolman (26), Rogers, Snygg and Combs (25), Cantril (4), Lewin (17), Krech and Crutchfield (11), and others. The theoretical approaches just mentioned are by no means entirely identical; in some of them the role of ego factors and action potentialities is stressed more than in others (e.g., by Cantril as contrasted with the Gestalt group), but in all of them behavior is viewed as understandable in terms of the phenomenal world.

What are the reasonable expectations of people at a theater fire or in similar circumstances in which a panic is apt to develop? Situations of this type tend to have a characteristically unstable reward structure, which has been generally overlooked by social scientists as a factor in panics. Cooperative behavior is required for the common good but has very different consequences for the individual depending on the behavior of others. Thus at a theater fire, if everyone leaves in an orderly manner, everybody is safe, and an individual waiting for his turn is not sacrificing his interests. But, if the cooperative pattern of behavior is disturbed, the usual advice, "Keep your head, don't push, wait for your turn, and you will be safe," ceases to be valid. If the exits are blocked, the person following this advice is likely to be burned to death. In other words, if everybody cooperates, there is no conflict between the needs of the individual and those of the group. However, the situation changes completely as soon as a minority of people cease to cooperate. A conflict between the needs of the group and the selfish needs of the individual then arises. An individual who recognizes this state of things and who wants to benefit the group must sacrifice his own selfish needs.

It is suggested here that it is chiefly the reward structure of the situations which is responsible for non-adaptive behavior of groups at theater fires and similar situations. People are likely to recognize the threats to themselves, as they appear, and behave accordingly. These situations may be compared to states of unstable equilibrium in mechanics; a cone balanced on its tip is not likely to remain in this position a long time because a slight initial displacement of its center of gravity allows the force of gravity to make it fall all the way. Similarly, cooperative behavior at a theater fire is likely to deteriorate progressively as soon as an initial disturbance occurs. If a few individuals begin to push, the others are apt to recognize that their interests are threatened; they can expect to win through to their individual rewards only by pressing their personal advantages at the group's expense. Many of them react accordingly, a vicious circle is set up, and the disturbance spreads. Competitive behavior (pushing and fighting) may result, as e.g., at theater fires, or the group may disperse as in military panics. There is another factor which makes for further disintegration. As the behavior of the group becomes increasingly disorderly, the amount of noise is apt to increase, and communication may then become so difficult that no plan for restoring order can emerge.

This interpretation is almost the reverse of the conventional ones which ascribe non-adaptive group behavior to emotional facilitation and to the supposed alterations of personality in group situations.

The existence of mutual emotional facilitation is not denied; its operation can be readily observed, e.g., in college students during final examinations, in audiences at sports events, etc. However, it is not believed that emotional excitement as such is responsible for non-adaptive group behavior. There are

many situations in which intense emotional excitement is the rule, and yet no non-adaptive group behavior appears. Thus it has been reported that intense fear is practically universally present in soldiers about to go into battle and yet no panic need develop. Similarly, participants in an athletic contest are apt to be so emotionally excited that vomiting is common; no markedly non-adaptive group behavior appears to develop as a result of this kind of intense excitement.

The assumption of personality alterations of people due to crowd membership appears to be entirely unsubstantiated in the case of panics. On the contrary, the competitive behavior or dispersal occurring in panics suggests that group cohesion disappears and that people begin to behave purely as individuals in accordance with their selfish needs.[3] Rather similarly Freud has explained certain types of panics in terms of the disappearance of the libidinal ties between individuals (5, pp. 45–48).

As a first step towards the verification of the proposed theory, a set of laboratory experiments was devised. It was thought that if the theory is correct it should be possible to illustrate its functioning in the laboratory. If not substantiated by laboratory findings, the theory would have to be discarded.

EXPERIMENTAL DESIGN

The experiments were conducted with groups of people, 15 to 21 subjects in each group. The subjects had the task of pulling cones out of a glass bottle; each subject was given a piece of string to which a cone was attached. Cooperation on the part of the subjects was required if the cones were to come out; the physical setup made it easy for "traffic jams" of cones to appear at the bottle neck. Only one cone could come out at a time; even a near-tie between two cones at the bottle neck prevented both from coming out because the narrow apex of the second cone, wedged into the bottle neck, blocked the path for the wide base of the cone ahead of it. The cones had to arrive at the bottle neck in order, one at a time.

[3] The writer is indebted to Dr. M. Scheerer for pointing out this inference from the suggested theory.

Experimental Situations

1. One of the experimental setups was designed to show that it was possible to produce disorganized, uncooperative, non-adaptive group behavior resulting in "traffic" jams by duplicating the essential features of panic-producing situations, as explained in the theoretical section of this paper. The experimental situation was represented to the subjects as a game in which each participant could win or lose money. A subject could win or lose depending on how successful he was in pulling out his cone. Success was defined in terms of arbitrary time limits in some experiments. In other experiments water was made to flow into the bottle through a spout near the bottom and the subject was successful if his cone came out of the bottle untouched by the water. Inasmuch as the rewards and fines were offered to individuals, depending on what would happen to their particular cones, it was thought that the cooperative pattern of behavior, required for group success, would be easily disrupted; a momentary "traffic jam" at the bottleneck would be perceived by some of the subjects as threatening them with loss in the game as a result of the anticipated failure of cooperative behavior. These subjects would be tempted to save themselves from the loss by pulling out of turn. Some of them would probably do so, and thus the situation could be expected rapidly to deteriorate after an initial disturbance occurred.

In order that subjects who recognized that full success was out of their reach should not stop trying, intermediate steps between full success and full failure were announced. The details and the amounts of rewards and fines are summarized in the table of results.[4] The monetary rewards and fines were very small, the rewards for full success ranging from 10 to 25 cents, the fines for full failure from 1 to 10 cents. The very small fines were decided upon because it was intended to show

[4] The appendix, including a detailed table of the data from each experiment, has been deposited with the American Documentation Institute to reduce printing costs. For the six pages of the appendix, order Document 2815 from American Documentation Institute, 1719 N Street, N.W., Washington 6, D. C., remitting $0.50 for microfilm (images 1 inch high on standard 35 mm. motion picture film) or $0.60 for photocopies (6 x 8 inches) readable without optical aid.

that the characteristically inefficient, non-adaptive features of group behavior such as occurs in panics can be reproduced in a situation in which there was no opportunity for fear. It was not thought that the small rewards and fines were likely to constitute real financial incentives for college students. They were introduced so as to emphasize the nature of the experimental situation as a game in which individuals could win or lose.

2. In the contrasting experimental setups there were no individual rewards or fines, and there was no flow of water except for a few control experiments. The experiments were described as attempts to measure the ability of groups of people to behave cooperatively. Good performances of other groups were quoted. It was expected that under these conditions no "traffic jams" would develop. Subjects had no motivation to disregard any plan that might be devised by the group; the only incentive offered was membership in a group of people who were going to show their ability to cooperate effectively with each other.[5] Thus the reward structure was the principal experimental variable studied in these two experimental situations.

3. Another variable investigated was the excitement built up by mutual facilitation. In a number of "no-reward" experiments several subjects were asked to act as accomplices. They were secretly instructed before the experiment began to scream, behave excitedly, swear, and make as much noise as possible. To limit their influence to emotional facilitation they were asked not to give specific bad advice nor to disturb the workings of any plan the group might decide upon. It was expected that the added emotional excitement, which is the major factor in Le Bon's and similar theories of panics, would not have much effect on the results.

4. In certain of the reward-and-fine experiments an attempt was made to minimize the opportunities for mutual emotional facilitation by largely preventing the subjects from seeing each other. This was accomplished by a circular screen with holes for eyes and arms and with vertical partitions on the outside, placed around the glass bottle. Each subject stood in an individual "stall" hiding him from his neighbors; he saw the bottle standing on the floor through the eye hole; only his arm and eyes could be seen by the other subjects, and the eyes were not likely to be seen because the subjects were mainly looking at the bottle tied to the floor. In order to prevent excited screams, the subjects were asked to remain silent after the experiment began, which request was largely complied with. It was expected that the results would be essentially the same as those in the other reward-and-fine experiments.

5. A third variable which was introduced in a few of the experiments was interference with the opportunity to arrive at a plan of action. In most of the experiments the subjects were not prevented from conducting preliminary discussions; in almost all instances either they started such a discussion immediately or asked for permission to do so, which was given. Only twice did a group fail to discuss and agree upon a plan when discussion was not explicitly forbidden. On the other hand, in two of the reward-and-fine experiments conducted early in the study the subjects were forbidden to talk to each other both before and during the experiment; in one reward-and-fine experiment conducted immediately after three no-reward experiments with the same group, the subjects were prevented from having a preliminary discussion so that no plan could be agreed upon beforehand, but were allowed to talk during the experiment.

Apparatus and Procedure

Figure 1 gives the shapes and dimensions of the cones and of the bottle and shows where the pieces of string were attached. The cones were made of wood in the early experiments. Later, aluminum cones were substituted [6] because the wooden one tended to become tightly forced into the bottle neck and had to be loosened by hand (which was done promptly by the experimenter). In the experiments with the aluminum cones the glass bottle had too large an opening, which

[5] The need to belong has been particularly emphasized as an important motive, among others, by E. Fromm (6) and M. Sherif (22). The important role which group membership plays in industry has been investigated particularly in the Hawthorne studies (e.g., 30).

[6] Post-war shortages prevented the use of smooth plastic material, as had been intended.

was remedied by the insertion of a cylinder with a 1-inch hole bored through it. This cylinder, made of aluminum, had rubber tape wound on the outside. It was forced tightly into the bottle neck and was tied down with wire. In addition to cutting down the opening of the bottle to the desired diameter, it also protected the glass from the impact of the aluminum cones. A sponge rubber pad

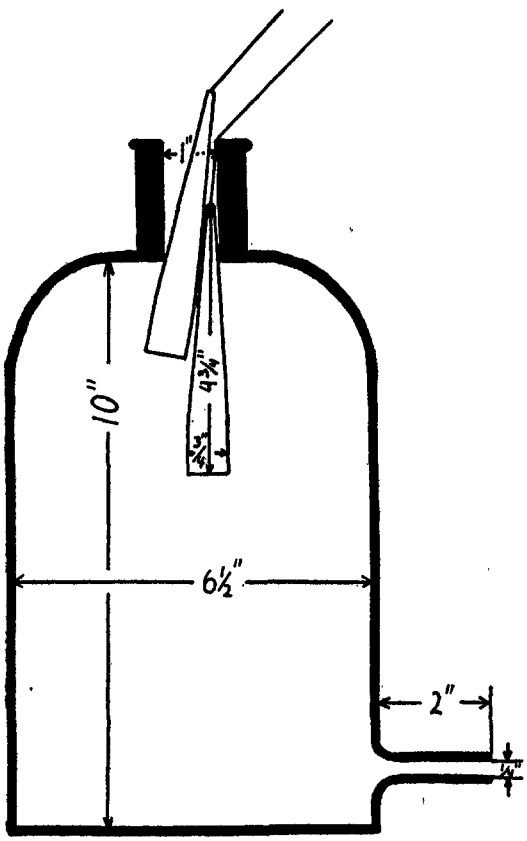

FIG. 1. CROSS-SECTION OF THE GLASS BOTTLE WITH TWO CONES SHOWN BLOCKING THE BOTTLE NECK

Main dimensions of the equipment are given.

was cemented to the bottom of the glass bottle. A rubber tube could be attached to the spout and lead either to a water faucet or to another similar bottle placed high up.

The screen was made of corrugated cardboard. Two strips 23.5 feet in length were cut off a 3-foot-wide roll and glued together, so that a strip 6 feet wide resulted. The ends of the strip could be brought together and the strip could be made to stand on edge in the shape of a cylinder around the bottle. Pieces of corrugated cardboard, 3 feet by 1 foot, were attached to the screen at intervals of 1 foot 3 inches, subdividing the space immediately around the screen into individual stalls. The rectangular eye holes cut in each stall were 1.5 inches high, 5 inches wide; their bottom was 4 feet 8 inches above the ground; the roughly circular arm holes were about 5 inches in diameter and 3 feet 1.5 inches from the ground, near the right hand edges of the stalls. There were 18 stalls altogether.

In putting the cones into the bottle, care was taken to prevent the tangling of strings; as an added precaution, the fishing line used as string was waxed in later experiments. In the early experiments the bottle was tied to the legs of a table on which it was placed. In the later experiments it was placed on the floor and tied to nails driven into the floor like tent stakes.

The instructions were not rigidly standardized. The rewards were always larger than the fines, ranging from 10 to 25 cents in different experiments. The fines ranged from 1 to 5 cents. Examples of the two main types of instructions and other details of the experimental procedures follow:

1. *A Reward-and-Fine Experiment.* "I need volunteers for an experiment which is set up as a game in which you can win up to a quarter or lose up to 2 cents [or 5 or 10 cents as the case may have been]." Then, after the volunteers (sometimes after some urging) assembled: "As I said, this is going to be like a game. Each of you will receive a cone with an attached piece of string. All cones will be placed into the bottle. The object of the game is to get your cone out before it gets wet. You may start pulling when I give the signal, 'ready-go!' but only one cone can come out at a time. If two get into the bottle neck, neither comes out (demonstration). Simultaneously, I shall start water flowing into the bottle. If your cone comes out dry you get a quarter. If less than a third of it is wet, you get nothing; if more than a third but less than two-thirds of it gets wet, you pay a penny fine. If the cone is more than two-thirds wet, you pay a two-cent fine. The fines will be contributed to the Student Council." Then the students were asked to put their cones in the bottle. While they were doing it, a discussion of a plan for action generally started and was not interfered with by the experimenter.

The signal to begin was given after an agreement was reached by the subjects. When in doubt, the

experimenter asked the group whether they were ready.

2. *A No-Reward Experiment.* "This is going to be an experiment in which your ability to cooperate with each other will be measured. I need volunteers." Then, after the subjects assembled around the bottle, the procedure continued exactly as in the reward-and-fine experiments except that no rewards were offered, the rubber tube was not attached, and no reference to water was made. Instead, after the possibility of "traffic jams" was demonstrated, the experimenter said: "In spite of the smallness of the opening, a group of students from the University of Nevada succeeded in cooperating with each other so well that they got all their cones out in 10.5 seconds. See if you can do as well as the Westerners!"

RESULTS

The conditions and results of all of the experiments conducted so far are indicated in a table in an appendix.[7] Forty-two experiments with 26 groups of subjects were performed altogether, including some preliminary and control experiments conducted to investigate potential sources of error. In the table each experiment is identified by a code symbol consisting of letters and a number.

One experiment (R1) was conducted before the procedure was fully developed; there were no fines and only one reward level was announced. No "traffic jam" resulted.

There were 16 experiments with rewards and fines. In three of them (RF1 to RF3) discussion was interfered with before the experiment, so that the subjects had no opportunity to devise a plan of action. In all three experiments "traffic jams" developed. In only one of them did the subjects succeed in pulling *any* cones out of the bottle—two cones out of 19 in 40 seconds; these same subjects had successfully pulled out *all* cones in 18.6 seconds and 23 seconds in two immediately preceding trials in which there had been no rewards and in which they had had the opportunity to agree upon a plan of action.

In the other 13 reward-and-fine experiments (RF4 to RF16) discussion was not interfered with. In eight of these experiments (RF4 to RF6, RF9, RF10, RF12, RF13, and RF16) there were serious "traffic jams," the large majority of the cones failing to be pulled out of the bottle within times ranging from one to approximately two minutes. In another experiment almost half of the cones were in the bottle after 1 minute (RF15). In two of these experiments (RF15 and RF16) the factor of mutual emotional facilitation was minimized by the use of the screen. The results were much the same as in most of the other reward-and-fine experiments, suggesting that this factor was not primarily responsible for the results.

In four of the reward-and-fine experiments (RF7, RF8, RF11, RF14) there were no serious "traffic jams"; all or almost all of the cones came out of the bottle in less than a minute. In three of these experiments the experimenter was unable to persuade the winners to take the rewards; apparently the subjects had failed to accept the situation as a game with winners and losers. In one of these experiments there was an additional factor which probably interfered with "traffic jams"; immediately before this experiment (RF14) these subjects had participated in another (NR5) in which no rewards had been offered and in which the fastest time of any group was achieved (10 seconds). The subjects knew the time of this trial; the time allowance for winning exceeded it by 5 seconds, so that the chances of losing must have been recognized as slight by the subjects.

In the remaining 25 experiments there were no rewards or fines. Twenty of these experiments were described to the subjects as measures of cooperation. These experiments fell into three groups. Experiments NR1 to NR5 were conducted with groups of subjects who had not been previously exposed to similar experiments, and under "natural" conditions, i.e., without the experimenter entering into a conspiracy with accomplices. Experiments NR6 to NR12 were similar but were conducted immediately after experiments with accomplices. Experiments ANR1 to ANR8 were the experiments with accomplices who had been instructed to make noise and to stir up excitement in the group.

No serious traffic jam developed in any of these experiments, not in those with new subjects, nor in those with accomplices, nor in those preceded by experiments with accomplices. The times for taking *all* cones out of the bottle ranged in these three groups of

[7] See footnote 4, p. 152.

experiments from 10 to 22 seconds, from 10.5 to 30 seconds and from 13.4 to 59 seconds.

The experimenter's accomplices were generally able to stir up excitement but this excitement failed to disrupt the cooperative behavior of the group to an extent comparable to that of the effect of the individual rewards and fines. In most of the reward-and-fine experiments the majority of the cones were still in the bottle after a minute or longer had elapsed.

Did the accomplices have any effect? The mean times of the two groups of the no-reward, no-accomplice experiments were 16.8 seconds (NR1 to NR5) and 19.6 seconds (NR6 to NR12); the mean time of the accomplice experiments was 34.4 seconds. The difference between the times of the two groups of experiments without accomplices is very small and not statistically significant. In the accomplice experiments the mean time was longer, significantly so at the .01 level of confidence, suggesting that the accomplices did have some disrupting effect. However, a closer examination of the data shows that the two longest times in the accomplice experiments were obtained when some of the accomplices had misunderstood the instructions and gave bad advice to the group. If the results of these two experiments (ANR1 and ANR8) are eliminated, the mean time drops to 26.4 seconds, and the critical ratio (Fisher's t for small, uncorrelated samples) indicates that the difference between this time and that of the no-accomplice experiments is too small to reach the conventional standards of statistical significance ($t=1.82$, $d.f.=16$, $P>.05$). Thus it was not established with certainty that the accomplices who made noise and stirred up excitement without giving bad advice had a disrupting effect on group cooperation. They may have had; the evidence was inconclusive. More experiments would have been needed to establish this point. The experiments with accomplices were designed merely to discover whether an additional opportunity for mutual emotional facilitation would seriously disrupt group cooperation. They served their purpose in showing that it did not; and since the question whether it had a minor disrupting effect was not directly related to the main problem of this study in any case, the matter was not further investigated.

There were several additional no-reward experiments (PC1 to PC5). One of these was described to the subjects as a preliminary trial conducted in order to determine the proper conditions for the next experiment in which rewards were to be offered. This was the only no-reward experiment in which a serious "traffic jam" developed; there was no organized plan for action in this group, probably because the subjects were not sufficiently motivated to devise one before the experiment began. The remaining four experiments were described to the subjects, who had previously participated in reward-and-fine experiments, as control experiments conducted in order to demonstrate to the group what were the effects of the rewards. In view of the common claim of the subjects that the flow of water was primarily responsible for the "traffic jams" water was made to flow in three of them. No serious "traffic jam" developed in any of the control experiments. On the other hand, three out of the four times were distinctly slow ones as compared to those in the other no-reward experiments. It is not clear whether this finding was due to fluctuations of random sampling ("chance"), whether the subjects were inadequately motivated in these "control" experiments, or whether the earlier reward-and-fine experiments had continued bad effects on the cooperative behavior of the subjects. The matter was not investigated at this time.

After each experiment or group of experiments the subjects were told by the experimenter about the true nature of the experiments and about the results obtained so far. The explanations were followed by discussions. In the groups which had failed to pull out the cones from the bottle, marked tendencies towards rationalization appeared during these discussions. Subjects tended to explain the bad results of their group in terms of supposedly tangled strings, effects of the water, or insufficient time for the formulation of a plan, disregarding the fact that these factors failed to produce "traffic jams" in no-reward experiments.

DISCUSSION

The theory presented at the beginning of this paper is opposed to the common tendency to view emotion as a predominantly disruptive factor in behavior. It developed out of an attempt to reconstruct the phenomenal situation in circumstances leading to a panic. The present writer views this approach as a fruitful one and finds it congenial. On the other hand, it is not considered to be the only fruitful approach to psychology and the experiments reported in this paper do not constitute a crucial test of this type of approach. One can treat the same situation and behavior occurring in it in phenomenal terms (25), or in terms of psychological "genotypical" constructs (17), or in physiological terms, or in terms of stimuli, responses, and operants which are not defined physiologically (24). In other words, one can operate within any one of several possible universes of discourse. One such universe of discourse may be more convenient and more suggestive of fruitful hypotheses to a particular investigator, than another, and one universe of discourse may have philosophical advantages compared to another one. Generally speaking, the choice of the universe of discourse cannot be definitely settled by any experiments. Personal preferences of investigators vary, and facts tend to be equally compatible with virtually all philosophical systems except possibly in very advanced sciences.[8]

The experiments provide laboratory demonstrations for our hypothesis and partially verify the hypothesis. The behavior of the subjects did not tend towards inefficiency unless the reward structure of the situation provided them with incentives to behave uncooperatively after the cooperative pattern of group behavior was disturbed. There were no "traffic jams" in the no-reward experiments. Emotional excitement produced by the experimenter's accomplices interfered with the efficiency of group behavior only to a minor extent, if at all, compared to the effects of individual rewards and fines. On the other hand, there were inefficient behavior and "traffic jams" in more than half of the reward-and-fine experiments, in which the subjects were confronted with the probability of individual failure, as soon as the bottle neck was temporarily blocked. This result was obtained without any more serious threat to the individuals than the loss of ten cents at most and probably a mild feeling of failure in a game. Thus intense fear was not found to be an essential condition of chaotic, non-adaptive group behavior analogous to that occurring in panics.

"Traffic jams" did not occur in all of the reward-and-fine experiments and were not expected to. In an experiment with 15 to 20 subjects one cannot be certain that one or a few subjects will create a disturbance within the short time available. With larger groups the percentage of "traffic jams" should be larger; the more people there are, the more likely it becomes that one uncooperative individual will create the initial disturbance which leads to deterioration of the situation.

The theory presented here, if correct, appears to apply to many situations and to contribute to the understanding of a number of social and economic phenomena. Situations with reward structures resembling that of panics and the reward-and-fine experiments reported here seem to be numerous. Tendencies towards non-adaptive group behavior are clearly present in many such situations, regardless of the presence or absence of face-to-face contacts between people and opportunities for mutual emotional facilitation. Runs on banks resulting in bank failures, violations of price-fixing agreements among business men resulting in cut-throat competition, hoarding behavior of consumers during periods of scarcity of goods resulting in shortages are all forms of ultimately non-adaptive behavior which can be interpreted in terms of unstable reward structures of the situations. On the other hand, there are situations in which the appearance of danger does not provide incentives for anti-social behavior. In such situations no chaotic non-adaptive behavior of groups seems to occur in spite of the catastrophic nature of the danger and ample opportunity for face-to-face contacts. There seem to be no panics when people are trapped

[8] The author hopes to develop this viewpoint in another paper. The ideas expressed here have been influenced by the epistemological considerations of H. Reichenbach in one of his earlier works (20).

so that there can be no struggle for an exit, e.g., at submarine and mine disasters (32).

It is intended to deal in future publications with social and economic data pertaining to both group behavior which tends to deteriorate and group behavior which tends to remain adaptive in nature. Full verification of the theory cannot be accomplished in terms of laboratory experiments; it requires investigation of real life situations. An examination of one set of relevant data, viz., gasoline consumption figures during the period of developing gasoline shortages in 1941, is in progress at present.

The experiments reported here belong also in a second theoretical context. In these experiments a system of individual rewards resulted in strikingly inefficient behavior, while the goal of demonstrating the ability of the group to cooperate produced much more orderly action. These findings may be compared with those of the type reported by Maller (18) and Sims (23), who found that individual competition led to greater efficiency than group competition. It should be noted that the structure of the tasks in these earlier experiments and those reported here differed. In the former experiments the subjects worked separately and could not interfere with each other as readily as in our experiments. Thus the experiments provide an additional illustration for the caution that any generalization pertaining to the effect of competition on behavior is limited not only by the prevalent social norms and personality characteristics, but also by the nature of the task, as was pointed out, e.g., by Klineberg (9, p. 338).

SUMMARY

A theory is suggested, explaining the nonadaptive features of behavior occurring in panics in terms of the reward structure of the situations rather than in terms of mutual facilitation of emotion. In panic-producing situations cooperative behavior is needed for success and is rewarding to individuals as long as everybody cooperates. However, once the cooperative pattern of behavior is disturbed, cooperation ceases to be rewarding to the individuals; then a competitive situation is apt to develop which may lead to disaster. Thus at a theater fire it pays not to push if everybody cooperates, but if a few uncooperative individuals block the exits by pushing, then any individual who does not push can expect that he will be burned. Pushing becomes the advantageous (or least disadvantageous) form of behavior for individuals, and disorder leading to disastrous consequences spreads rapidly.

Laboratory experiments with miniature social situations are reported in which the effects of the reward structure on group behavior in situations in which cooperation was required for success was studied. In these experiments the subjects had to take cones out of a bottle; only one cone could be taken out at a time and the bottle neck was easily blocked by too many cones arriving simultaneously, so that the cones came out only if the subjects cooperated with each other. The situation was represented to some of the groups of subjects as a game in which one could win or lose small sums of money; to other groups the experiment was described as a measure of their ability to cooperate. The opportunities for mutual emotional facilitation were also varied in some experiments.

In the majority of cases, serious "traffic jams" resulted when individual rewards and fines were offered, preventing the taking out of any or most of the cones. No similar disturbances were observed in the "measure of cooperativeness" experiments. In the reward-and-fine experiments, the introduction of a screen hiding the subjects from each other, so as to minimize opportunities for mutual emotional facilitation, did not prevent "traffic jams" from occurring. In the experiments without individual rewards, excited screaming in the group (arranged by the experimenter) had little if any effect on the results.

The experiments gave the expected results, thus contributing to a partial verification of the theory; full verification would require examination of real life data, which is planned. The theory appears to apply to other social phenomena in addition to panic.

REFERENCES

1. ASCH, S. E. Understanding vs. suggestion in the social field. *Psychol. Bull.*, 1940, 39, 466–467.

2. ASCH, S. E. The doctrines of suggestion, prestige and imitation in social psychology. *Psychol. Rev.*, 1948, **55**, 250–276.
3. BRITT, S. H. *Social psychology of modern life.* New York: Farrar and Rinehart, 1941.
4. CANTRIL, H. *Understanding man's social behavior, preliminary notes.* Princeton: Office of Public Opinion Research, 1947.
5. FREUD, S. *Group psychology and analysis of the ego.* London: Hogarth Press, 1910.
6. FROMM, E. *Escape from freedom.* New York: Farrar and Rinehart, 1941.
7. KATONA, G. *War without inflation.* New York: Columbia Univ. Press, 1942.
8. KATONA, G. Expectations and buying intentions of consumers. *Amer. Psychologist,* 1948, **3**, 273.
9. KLINEBERG, O. *Social psychology.* New York: Holt, 1940.
10. KOFFKA, K. *Principles of gestalt psychology.* New York: Harcourt, Brace, 1935.
11. KRECH, D., AND CRUTCHFIELD, R. C. *Theory and problems of social psychology.* New York: McGraw-Hill, 1948.
12. LE BON, G. *The crowd.* London: Unwin, 1916.
13. LE BON, G. *Bases scientifiques d'une philosophie de l'histoire.* Paris: Flammarion, 1931.
14. LEEPER, R. W. A motivational theory of emotion to replace "emotion as disorganized response." *Psychol. Rev.*, 1948, **55**, 5–21.
15. LEVY, E. A case of mania with its social implications. *J. soc. Research,* 1936, **3**, 488–493.
16. LEWIN, K. Vorsatz, Wille und Bedürfnis. *Psychol. Forsch.*, 1926, **7**, 330–385.
17. LEWIN, K. *Principles of topological psychology.* New York and London: McGraw-Hill, 1936.
18. MALLER, J. B. Cooperation and competition. *Teach. Coll. Contr. Educ.*, 1929, No. 384.
19. MURPHY, G. Address at Symposium: The role of the psychologist in the establishment of better human relations. Meeting of Amer. Psychol. Assn., Boston, Sept. 7, 1948.
20. REICHENBACH, H. *Relativitätstheorie und Erkenntnis a priori.* Berlin: Springer, 1920.
21. ROSS, E. A. *Social psychology.* New York: Macmillan, 1908.
22. SHERIF, M. *An outline of social psychology.* New York: Harper, 1948.
23. SIMS, V. M. The relative influence of two types of motivation on improvement. *J. educ. Psychol.*, 1928, **19**, 480–484.
24. SKINNER, B. F. *The behavior of organisms.* New York: Appleton-Century-Crofts, 1938.
25. SNYGG, D., AND COMBS, A. W. *Individual behavior.* New York: Harper, 1949.
26. TOLMAN, E. C. Cognitive maps in rats and men. *Psychol. Rev.*, 1948, **55**, 189–208.
27. VAUGHN, W. F. *Social psychology.* New York: Odyssey Press, 1948.
28. WATSON, J. B. *Psychological care of infant and child.* New York: Norton, 1928.
29. WERTHEIMER, M. Unpublished lectures.
30. WHITEHEAD, T. N. *The industrial worker.* Cambridge, Mass.: Harvard Univ. Press, 1938. Vol. 1.
31. YOUNG, K. *Social psychology.* New York: Crofts, 1944.
32. Dying miners wrote notes to their families as deadly gas crept on them in Illinois pit (Anon.). *New York Times,* March 31, 1947, p. 8.

Received February 1, 1950.